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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/338,520	06/23/1999	SUNGHO JIN	2925-0329P	1494

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EXAMINER

CLOVE, THELMA S

ART UNIT	PAPER NUMBER
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2879

DATE MAILED: 04/08/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/338,520

Applicant(s)

JIN ET AL.

Examiner

Thelma S Clove

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 15 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4, 6-22 and 36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-9, 14-20 and 36 is/are rejected.
- 7) ☒ Claim(s) 10-13, 21 and 22 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 1/15/02 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Election/Restrictions***

1. Applicant's election with traverse of group I in Paper No. 10 is acknowledged. The traversal is on the ground(s) that the additional search for the method claimed in group II would not be an undue burden on the Examiner. This is not found persuasive because the apparatus of group I can also be made without the substrate being prepared before the application of the buffer, as well as the method of manufacturing of group II having a separate classification than the apparatus of group I. Because these inventions are distinct for the reasons given above and the search required for Group II is not required for Group I, restriction for examination purposes as indicated is proper.

The requirement is still deemed proper and is therefore made FINAL.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 7, 9, <sup>16</sup>17-18 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Buxbaum (US 4274030).

4. Regarding claim 1, Buxbaum teaches a thermionic cathode comprising a substrate (1), an emissive layer (2) and a buffer (3) located between the substrate and

emissive layer inhibiting interaction of the emissive layer and the substrate by blocking (in column 2 lines 29-21, column 3 lines 30-38 and figure 1).

5. Regarding claim 7, Buxbaum teaches the buffer being made of rhenium and the substrate being made of molybdenum, tungsten or tantalum (in column 3 lines 30-38 and column 5 lines 19-27).

6. Regarding claim 9, Buxbaum shows the cathode having a curved shape (in figure 2).

7. Regarding claim 16, Buxbaum teaches the buffer layer alloying with the emissive layer (in column 4 lines 24-27).

8. Regarding claims 17-18, and 20, Buxbaum teaches the buffer as an alloy comprising Re, Hf, Ru, or Os (in column 2 lines 48-57).

1. Claims 1-4, 6, 8, and 36 are rejected under 35 U.S.C. 102(b) as being anticipated by Frank et al. (US 4522852).

2. Regarding claim 1, Frank teaches a thermionic cathode comprising a substrate, an emissive layer and a buffer layer inhibiting the interaction of the substrate and emissive layer by blocking and altering (in column 7 line 45- column 8 line 21). Frank teaches using a buffer layer which is insoluble in the substrate layer so that the buffer forms a barrier layer (blocking) as well as inhibiting the grain growth (altering).

3. Regarding claims 2 and 3, Frank teaches the buffer protecting from grain growth and destruction of the preferred crystallographic orientation (in column 4 lines 49-59, column 5 lines 5-6, 29-31 and 49-52 and column 7 lines 30-33).

4. Regarding claim 4, Frank teaches a cathode according to claim 3, wherein the grain sizes of the grains at the surface of the substrate are preferred to be 1 micrometer or less (in column 7 lines 60-61).

5. Regarding claim 6, Frank teaches a cathode according to claim 1, wherein the buffer inhibits the growth in the base and the emitting layers (in column 7 lines 30-34).

6. Regarding claim 8, Frank teaches a cathode wherein the base and buffer layer are both refractory metals (in column 5 lines 5-6 and column 7 lines 30-34).

7. Regarding claim 36, Frank teaches the cathode stabilizing the crystalline

structure of the substrate (in column 7 lines 55-63) (*flocking by reacting to inhibit crystal growth in the substrate*)

**Claim Rejections - 35 USC § 103**

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buxbaum (US 4274030) in view of Krijn (US 6236052).

1. Buxbaum teaches a thermionic cathode according to claim 1.

2. Buxbaum does not teach a thermionic cathode used as part of a projection electron lithography system wherein the system is a SCALPEL™ system.

3. Krijn teaches a SCALPEL<sup>TM</sup> projection electron lithography system with an electron beam source (in column 1 lines 66-67 and column 4 lines 21-25).
4. Buxbaum teaches that the cathode with the buffer layer allows an optimal utilization of materials and a long life (in column 1 line 64- column 2 line 2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the thermionic cathode of Buxbaum in the SCALPEL<sup>TM</sup> projection electron lithography system taught by Krijn since the thermionic cathode of Buxbaum allows an optimal utilization of materials and a long life as taught by Buxbaum.

11. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Buxbaum (US 4274030) in view of Frank et al. (US 4533852).
12. Regarding claim 19, Buxbaum teaches the cathode with a buffer according to claim 17, wherein the substrate is made of Mo, W, or Ta and the buffer is made of Ru, as applied above.
13. Buxbaum does not teach the buffer made of a grain growth inhibiting structure.
14. Frank teaches a buffer for a thermionic cathode made of Ru with a substrate made of W, Mo or Ta, wherein the buffer inhibits the grain growth of the substrate (in column 7 lines 56-62 and column 8 lines 18 and 60-61).
15. Frank teaches that having the buffer as a grain growth inhibitor gives a greater mechanical stability and a longer life (in column 8 lines 9-11).

16. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the grain growth inhibiting buffer of Frank in the cathode of Buxbaum since the materials used for the substrate and the buffer are the same and inhibiting the grain growth increases the mechanical stability and life of the cathode as taught by Frank.

***Allowable Subject Matter***

17. Claims 10-13, 21-22, and ~~36~~ are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

18. The following is a statement of reasons for the indication of allowable subject matter: Regarding claim 10, the prior art of record neither shows nor suggests a thermionic cathode having a buffer which alters the grain structure of the substrate, thus inhibiting the interaction of the substrate and the emissive layer, wherein the buffer layer is a solid solution.

19. The closest art is Frank et al. (US 4533852), which teaches a thermionic cathode having a buffer layer, which inhibits the interaction of the substrate and emissive layer and alters the grain structure of the substrate. However, Frank does not teach the buffer as a solid solution. The Applicant teaches that having a solid solution buffer randomizes the grain structure of the substrate, thus giving the cathode a uniform work function distribution.

20. Regarding claims 21, the prior art of record neither shows nor suggests a thermionic cathode having a buffer including rhenium and tantalum along in combination with the other limitations of claim 21.

21. The closest art is Buxbaum, which teaches a thermionic cathode having a rhenium buffer in combination with the other limitations of claim 21. However, Buxbaum does not teach the buffer also including tantalum.

22. The Applicant teaches that having a tantalum and rhenium buffer causes the buffer layer to dominate the original substrate surface, thus giving the cathode a uniform work function distribution.

### ***Response to Arguments***

23. Applicant's arguments with respect to claims 1-4, 6-9, and 14-20 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Amra (US 3488549), Ishii et al. (US 4168565), Tanabe et al. (US 4893052), Gartner (US 4524297), and Billings (US 5911919).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thelma S Clove whose telephone number is (703) 308-6548. The examiner can normally be reached on Monday-Friday from 8 to 4:30.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D Patel can be reached on (703) 305-4794. The fax phone


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numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

  
TSC  
March 28, 2002

  
**ASHOK PATEL**  
**PRIMARY EXAMINER**